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DEPARTMENT OF NURSING EDUCATION

IN CHARGE OF

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The collaborators in this department will be glad to receive short items of interest relating to the field of training-school work. States east of the Mississippi should send their contributions to S. Lillian Clayton, Philadelphia General Hospital, Philadelphia, and those west of that section to Anna C. Jammé, Board of Health, Sacramento, California.

THE NEED OF CHEMISTRY IN THE TRAINING SCHOOLS

By Linette Parker, R.N.

New York

Within the last ten or twenty years chemistry as a basic science has gradually become of greatest importance. Nurses consider its value in relation to their profession, but nursing is only one of a large number of activities, a thorough understanding of which demands a knowledge of chemistry.

There has been much said of late about the woman in the home. A recent writer about women states that Ellen Richards in her application of chemistry and hygiene to the home did more to make homes livable than all the strictly domestic women before her. Cooking, the proper choice and preservation of foods and most of the cleaning processes involve chemical principles.

A good farmer today must know the chemistry of his soils, fertilizers and plant life; the mining engineer must know the chemistry of his metals; the bacteriologist is constantly using chemicals and chemical processes; the wonderful results in modern photography are possible only through the advance of chemistry. The modern pharmacist needs almost an expert knowledge of this science to understand the complex medicinal chemicals now being prescribed and to carry out the chemical tests and analyses required by the *United States Pharmacopeia;* the physician of today has no place in his profession if he has not a working knowledge of chemistry. It really seems not too much to say that a person can scarcely read the daily newspapers and modern magazines intelligently without being familiar to some degree with the science of chemistry. So this pressure of a new need which we are feeling in the hospitals is only a part of a general trend in education resulting from the recognition of the importance of this science.

It may be said that good nurses have been and are being graduated who never read a line in a chemistry. I would say that such nurses are not truly professional and that nursing will never be a profession until those who engage in it are acquainted with the sciences which underlie their work. Such a knowledge gives a nurse a certain mental poise, a confidence in herself, a mastery of her art which distinguish her from the uneducated, mechanical worker.

The subjects in the training schools which especially require a preliminary knowledge of chemistry are physiology, dietetics and materia medica. In physiology, for example, the reaction to litmus of the different parts of the alimentary canal and the different fluids of the body, the chemical processes which constitute a large part of digestion, the names of the important constituents of the blood, sweat and urine, the nature of catalytic agents, the processes of oxidation and reduction are all important and they all involve strictly chemical terms. How is it possible for a nurse to get any true conception of these things if she knows no chemistry? She can learn them and write them down on a quiz paper but she does not know them. One can remember when he reads that Edison's new submarine battery is an alkaline battery and he can tell it to someone else but if he does not know the nature and the reason for an alkaline battery he will not be talking intelligently.

How many nurses know what pitchblende is or anything about it? It is one of the ores from which radium is obtained, a simple fact, but a nurse who is made to learn and use chemical terms without knowing their meaning really knows as little about them as the ordintry person does about pitchblende.

The definition of camphor as given in the 1910 pharmacopeia is as follows: camphor is the dextro-gyrate modification of the saturated ketone obtained from cinnamomum camphora. To how many does that convey any meaning whatsoever? With not a very advanced knowledge of chemistry that sentence would convey a very definite conception of the nature of camphor. Yet nurses are expected to learn and remember the more simple chemical terms which convey no more meaning to her than that definition of camphor did to most of you readers.

In dietetics a nurse studies the food principles, starch, sugar, protein, and mineral salts. Cooking involves chemical changes in these substances which explain why toast is more digestible than new bread, why cereal is better when cooked a long time, why certain vegetables should not be cooked in salt, why meat must be seared on the outside for a roast and put into cold water for beef tea and so on. Without some knowledge of chemistry these facts will be learned but not understood.

In pharmacy, a branch of materia medica, one steps right into chemistry when she begins to teach solutions. One of the pharmaceutical solutions most familiar to nurses, Fowler's solution, is made by a chemical reaction; every effervescing powder depends on the chemical reaction in water of two of its ingredients. How much easier it is for a nurse to remember these two ingredients and how to care for and give an effervescing powder if she knows the theory!

In materia medica I suppose every teacher takes up the active principles of plants which are all strictly chemical compounds. A nurse is taught that morphine and strychnine are alkaloids but when she gives them she charts morphine sulphate and strychnine sulphate. You tell her they are salts. What are salts? Why not give the alkaloid itself? Potassium permanganate solution is taught as an antidote to alkaloid poisoning. Why is it efficient? Because of a chemical reaction which every nurse should understand. The use of acids and alkalies both externally and internally depends on their chemical reactions. It is hopeless to try to teach the nature of the innumerable organic compounds now being used, such as trional, ethyl chloride, salvarsan, without a background of chemistry.

If I were asked to teach materia medica to a class of nurses who knew no chemistry I would not know how to begin. In fact, in my opinion, it cannot be done. I could tell some facts about drugs and their action and drill until these facts were thoroughly memorized, this I admit is better than no materia medica at all, but I could not *teach* the subject. I could not give them an intelligent conception of the body of knowledge which we call materia medica and therapeutics.

Nearly every nurse in the classes in materia medica at Teachers College has had her materia medica in the training school without any preliminary knowledge of chemistry. In Teachers College they usually have chemistry first and such remarks as these are frequent: "With chemistry as a background, materia medica is so interesting;" "My chemistry has opened my eyes to so many things in materia medica," and "Chemistry has broadened my whole outlook on these nursing subjects."

Assuming now that everyone is convinced that a nurse needs chemistry as a foundation for her training, how and when is she to get it? In my opinion chemistry should be a requirement for admission to the probation class. Whatever the nature of such a preliminary course, it will give some basis for the nursing subjects and if chemistry is taught in the hospital that course can then be primarily applied chemistry. At the present time such a requirement would be impossible and short courses are being given in the training schools.

I feel that the teaching of elementary chemistry does not belong to the hospital training school. This is a school for specialized work. Chemistry is a big subject covering at least three years in a college of ordinary standing. If it is attempted in the hospital, the course consists of from ten to twenty lessons and the best of teachers under the best conditions can in that time give only the merest underlying principles. Even a very elementary course is worthless without laboratory experiments and a satisfactory general course requires extensive equipment which no hospital would be justified in buying.

Another important point is that chemistry should be taught by a *trained* teacher in that special subject. Few subjects are more difficult to teach well than this. There are so many conceptions to be formed which seem to have no connection with anything else in one's previous knowledge. One has to learn to think in new terms, to reform old ideas. Chemistry is a technical subject all parts of which are definitely inter-related. That is, one must be familiar with the whole to be able to teach the first part. It is almost impossible to teach the introductory lessons without using terms which logically would be studied later in the course. A chemistry teacher once told me that probably no science was universally so badly taught as this and it is difficult for a chemistry teacher to get a good position without a Ph.D. degree in that subject.

With these facts in mind, is it just to the pupils or the school to entrust the course in chemistry to an assistant whose only qualification is that she once had a course herself or to some young physician who volunteers his services but is not competent? No one would consider an ordinary general practitioner qualified to teach electrotherapy, for instance, in a medical school of good standing. No more is the ordinary physician or nurse competent to teach the general subject of chemistry.

Everyone familiar with the conditions realizes that the training school superintendent is often handicapped in her effort to give the best to her nurses and that the short course in chemistry in the training school is a step in the right direction. However, it is my conviction that chemistry should be made an entrance requirement and that any course, elementary or applied, given in the hospital demands a trained teacher. If no one connected with the hospital is competent, such a teacher should be paid for the course or the nurses sent to some near-by organized class. In New York City, the Board of Education will provide a teacher in the evening schools for a class of fifteen or more and in other cities and towns coöperation could doubtless be secured with the principals of high, technical, trade or evening schools.